

**Hamid Charkhkar**

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<b>Education</b>	<b>George Mason University (GMU)</b> , Fairfax, VA	
	Ph.D., Electrical and Computer Engineering,	2015
	<ul style="list-style-type: none"> <li>• Thesis Topic: <i>Microelectrode arrays for neuronal recordings: developing novel technology and applications</i></li> <li>• Advisor: Joseph. J. Pancrazio, Ph.D.</li> </ul>	
	<b>Ferdowsi University of Mashhad (FUM)</b> , Mashhad, Iran	
	B.Sc., Electrical Engineering,	2005
<b>Research Experience/Appointments</b>	<b>Investigator</b>	Mar. '17 - Present
	Advanced Platform Technology Center, Louis Stokes Cleveland VA Medical Center, Cleveland, OH	
	<b>Senior Research Associate</b>	Dec. '18 - Present
	Department of Biomedical Engineering, Case Western Reserve University (CWRU), Cleveland, OH	
	<b>Postdoctoral Scholar</b>	Aug. '15 - Nov. '18
	Department of Biomedical Engineering, CWRU, Cleveland, OH	
	<b>Graduate Research Assistant</b>	Sep. '10 - May '15
	Neural Engineering Lab., Department of Electrical Engineering, GMU, Fairfax, VA	
	<b>Research Intern</b>	Jun.'10 - Aug. '10
	Center for Devices and Radiological Health, US Food and Drug Administration (FDA), White Oaks, MD	
<b>Projects</b>	<b>Natural sensation of foot-floor interactions for trans-femoral amputees via neural stimulation</b>	
	Aug. '18 - Expected Aug. '22 Role : Co-Investigator	
	<ul style="list-style-type: none"> <li>• Supervised integration of a microprocessor knee prosthesis with external electrical stimulation controller boards.</li> <li>• Actively involved in recruitment of participants for the implant surgery.</li> <li>• Prepared and submitted quarterly project progress reports.</li> <li>• Identified and recruited junior staff including biomedical engineers, lab manager, and graduate students.</li> </ul>	

### **Restoring natural sensation to trans-tibial amputees**

Jun. '15 - Expected Dec. '20

Role: Associate Senior Researcher, Postdoctoral Scholar

#### Technical:

- Successfully demonstrated the feasibility of restoring natural sensation in four individuals with below-knee amputations using high-density cuff electrode technology.
- Programmed & controlled delivery of electrical stimulation to peripheral nerves in human.
- Developed necessary hardware and software for a sensory-enabled lower-limb prosthesis.
- Assessed the chronic performance and stability of cuff electrodes installed on peripheral nerves of human subjects.
- Designed and performed series of experiments to measure psychophysical properties as well as functional outcomes of stimulation-elicited sensation in lower limb during standing and walking.
- Supervised the technical development of a sensory neuroprosthesis for home & community use.
- Authored peer-reviewed publications and presented in scientific conferences, meetings, and workshops.

#### Administrative:

- Prepared and presented monthly and quarterly reports to the funding agency, Defense Advanced Research Projects Agency (DARPA).
- Actively participated in writing grant proposals submitted to Department of Defense (DoD) & DARPA. The submission to DARPA in 2016 resulted in acquiring new funds (\$900K) and extending the project timeline to recruit more participants. The submission to DoD resulted in securing funding of \$2.5 millions in 2018 to extend the scope of the project to above-knee amputees.
- Prepared the regulatory documents to obtain Institutional Review Board (IRB) and its subcommittees' approvals. The submission was for a non-minimal risk research study.
- Provided technical assistance to obtain FDA Investigational Device Exemption (IDE) approval.
- Developed statement of the work and project timeline with milestones and deliverable the projec.
- Built collaboration and closely worked with partners in industry (Ohio Willow Wood and Ottobock), academia (Case Western Reserve and University of Utah), and government (Department of Veteran Affairs and DARPA) to achieve the project's goals.

### **Biocompatibility of advanced materials for brain interfaces**

Nov. '11 - May '14

Role: Graduate Research Assistant

- Developed a functional neurotoxicity assay to determine the biocompatibility of novel materials for brain-computer interface.
- Characterized the effects of carbon nanotubes and conductive polymer-coated electrodes in neuronal recordings *in vitro*.
- Examined long-term stability of PEDOT, a conductive polymer, for neuronal recordings *in vivo*.
- Demonstrated the long-term neuronal recordings of shape-memory polymer intra-cortical probes.

### The Effects of Amyloid Beta on Living Neuronal Networks

Jul. '14 - Jun. '15

Role: Graduate Research Assistant

- Developed a functional neurotoxicity assay to determine the biocompatibility of novel materials for brain-computer interface.
- Designed a functional drug screening assay for  $\beta$  amyloid, a biomolecule associated with Alzheimer's disease.

### Flexible and disposable microelectrode arrays (MEAs) for extracellular recordings from neuronal networks *in vitro*

Jan. '11 - Mar. '15

Role: Graduate Research Assistant

- Determined the optimal inner-electrode distance to achieve selective recording by computational modeling in COMSOL.
- Demonstrated the suitability of newly-developed MEAs for *in vitro* use by successful extracellular recordings from primary neuronal cultures.
- Evaluated the performance of disposable MEAs in neurotoxicity applications.

### Assessing the damage to retinal tissue from electrical stimulation

Jun. '10 - Sep. '10

Role: Summer Intern

- Conducted optical coherence tomography imaging of retinal tissue under electrical stimulus.
- Quantified induced damage to retinal tissue due to electrical stimulation by processing histological H&E images in MATLAB.

### Design of MOSFET-only analog-to-digital converters using 0.18 $\mu$ m CMOS technology

Jan. '11 - Mar. '15

Role: Undergraduate Research Assistant

- Designed and simulated MOSFET-only capacitors for analog-to-digital converters. This work was published in Proceedings of ISCAS IEEE conferences in 2005.
- Simulated and analyzed switched-capacitor filters using 0.18  $\mu$ m CMOS technology. This work was published in Proceedings of ICM IEEE conferences in 2005.

### Journal Publications (Peer-reviewed)

1. **H. Charkhkar**, B. Christie, R. Triolo. Sensory neuroprosthesis improves postural stability under challenging balance conditions in lower-limb amputees. *Scientific Reports*. (Under review)
2. E. Ereifej, C. Shell, J. Schofield, **H. Charkhkar**, I. Cuberovic, A. Dorval, E. Graczyk, T. Kozai, K. Otto, D. Tyler, C. Welle, A. Widge, J. Zariffa, C. Mortiz, D. Bourbeau, P. Marasco. Neural engineering: the process, applications, and its role in the future of medicine. *Journal of Neural Engineering*, 2019.
3. B. Christie, **H. Charkhkar**, C. Shell, P. Marasco, D. Tyler, R. Triolo. Visual inputs and postural expectations affect the location of somatosensory percepts elicited by electrical stimulation. *Scientific Reports*, 9(1), 1-14, 2019.
4. **H. Charkhkar**, B. Christie, G. Pinault, D. Tyler, R. Triolo. A Translational framework for peripheral nerve stimulating electrodes: Reviewing the Journey

- from Concept to Clinic. *Journal of Neuroscience Methods*, 108414, 2019.
5. B. Christie, E. Graczyk, **H. Charkhkar**, D. Tyler, R. Triolo. Visuotactile synchrony of stimulation-induced sensation and natural somatosensation. *Journal of Neural Engineering*, 16(3), 036025, 2019.
  6. **H. Charkhkar**, C. Shell, P. Marasco, G. Pinault, D. Tyler, R. Triolo. High-density peripheral nerve cuffs restore natural sensation to individuals with lower-limb amputations. *Journal of Neural Engineering*, 15(5), 056002, 2018.
  7. D. Simon, **H. Charkhkar**, C. St John, S. Rajendran, T. Kang, R. Reit, D. Arreaga-Salas, D. McHail, G. Knaack, A. Sloan, D. Grasse. T. Dumas, R. Rennaker, W. Voit, J. Pancrazio. Design and demonstration of an intracortical probe technology with tunable modulus. *Journal of Biomedical Materials Research Part A* . 105(1), 159-168, 2017.
  8. **H. Charkhkar**, G. Knaack, D. McHail, H. Mandal, N. Peixoto, J. Robinson, T. Dumas, J. Pancrazio. Chronic intracortical neural recordings using microelectrode arrays coated with PEDOTTFB. *Acta Biomaterialia*. vol. 32: 57-67, 2016.
  9. **H. Charkhkar**, D. Arreaga-Salas, T. Tran, A. Hammack, W. Voit, J. Pancrazio, B. Gnade. Novel disposable microelectrode array for cultured neuronal network recording exhibiting equivalent performance to commercially available arrays. *Sensors and Actuators B: Chemical*. vol. 226: 232-238, 2016.
  10. **H. Charkhkar**, S. Meyyappan, E. Matveeva, J. Moll, D. McHail, N. Peixoto, R. Cliff, J. Pancrazio. Amyloid beta modulation of neuronal network activity *in vitro*. *Brain Res*. vol. 1629:1-9, 2015.
  11. H. Mandal, G. Knaack, **H. Charkhkar**, D. McHail, J. Kastee, T. Dumas, N. Peixoto, J. Robinson, J. Pancrazio. Improving the performance of poly(3,4-ethylenedioxythiophene) (PEDOT) for brain machine interface applications. *Acta Biomaterialia*. 10(6), 2014.
  12. **H. Charkhkar**, C. Frewin, M. Nezafati, G. Knaack, N. Peixoto, S. Sadow, J. Pancrazio. Use of cortical networks for *in vitro* material biocompatibility testing. *Biosensors and Bioelectronics*. vol. 53, 2013.
  13. G. Knaack, **H. Charkhkar**, F. Hamilton, N. Peixoto, T. O'Shaughnessy, J. Pancrazio. Differential responses to  $\omega$ -Agatoxin IVA in murine frontal cortex and spinal cord derived neuronal networks. *Neurotoxicology*. vol. 37, 2013.
  14. N. Peixoto, H. Nik, **H. Charkhkar**. Voice controlled wheelchairs: Fine control by humming. *Computer Methods and Programs in Biomedicine*. vol. 112, 2013.
  15. **H. Charkhkar**, G. Knaack, B. Gnade, E. Keefer, J. Pancrazio. Development and demonstration of a disposable low-cost microelectrode array for cultured neuronal network recording. *Sensors and Actuators B: Chemical*. vol. 161, 2012.
  16. E. Cohen, A. Agrawal, M. Connors, B. Hansen, **H. Charkhkar**, J. Pfefer. Optical coherence tomography imaging of retinal damage in real-time under a stimulus electrode. *Journal of Neural Engineering*. vol. 8, 2011.

## Book Chapters

1. G. Knaack, **H. Charkhkar**, S. Cogan, J. Pancrazio. Chapter 8 - Amorphous Silicon Carbide for Neural Interface Applications, In *Silicon Carbide Biotechnology (Second Edition)*, edited by Stephen E. Sadow, Elsevier, 2016, Pages 249-260.

**Conference  
Papers  
(Peer-reviewed)**

1. M. Schmitt, **H. Charkhkar**, R. Triolo. Mirror therapy improves the effectiveness of electrically elicited sensations. American Orthotic and Prosthetic Association (AOPA) 2019 National Assembly. San Diego, CA, Oct. 2019.
2. K. Cheng, **H. Charkhkar**, J. Yu, N. Makowski, R. Triolo. Probing peripheral neural pathways in electrically stimulation induced sensation. Proceedings of 2019 9th International IEEE/EMBS Conference on Neural Engineering (NER). San Francisco, CA, Mar. 2019, pp. 453-456.
3. **H. Charkhkar**, C. Shell, P. Marasco, D. Tyler, R. Triolo. Neural interface technology to restore natural sensation in lower-limb amputees. MEC '17: Myoelectric Controls Symposium. New Brunswick, Canada, Aug. 2017.
4. C. Shell, **H. Charkhkar**, P. Marasco, D. Tyler, R. Triolo. Standing balance responses to projected sensory stimuli in below-knee amputees. 41st Annual Meeting of the American Society of Biomechanics. Boulder, CO, Aug. 2017.
5. **H. Charkhkar**, G. Knaack, H. Mandal, E. Keefer, J. Pancrazio. Effects of carbon nanotube and conducting polymer coated microelectrodes on single-unit recordings *in vitro*. Proceedings of 36th Annual International Conference of the IEEE, Engineering in Medicine and Biology Society (EMBC'14), Chicago, IL, Aug. 2014, pp. 469-473.
6. F. Hamilton, A. Akhavian, G. Knaack, **H. Charkhkar**, S. Minnikanti, W. Kim, J. Kaste, N. Peixoto. Dynamic steering of *in vitro* cortical neurons using field stimulation. Proceedings of 36th Annual International Conference of the IEEE, Engineering in Medicine and Biology Society (EMBC'14), Chicago, IL, Aug. 2014, pp. 6577-6580.
7. **H. Charkhkar**, A. Asadi, R. Lotfi. A 1.8 V, 10-bit, 40MS/s, MOSFET-only pipeline analog-to-digital converter. Proceedings of IEEE International Symposium on Circuits and Systems (ISCAS), Island of Kos, Greece, May 2006, pp. 5363-5366.
8. R. Ghasemi, **H. Charkhkar**, A. Asadi, R. Lotfi, K. Mafinejad. Design of low-voltage MOSFET-only switched-capacitor filters. Proceedings of IEEE International Conference on Microelectronics (ICM), Islamabad, Pakistan, Dec. 2005, pp. 24-29.

**Poster  
Presentations**

1. **H. Charkhkar**, K. Cheng, N. Makowski, R. Triolo. Neural stimulation eliciting sensation activates reflex pathways in lower-limb amputees. 2019 Meeting of Society for Neuroscience (SfN). Chicago, IL, Oct. 2019.
2. B. Christie, **H. Charkhkar**, C. Shell, D. Tyler, R. Triolo. Evaluating the role of electrically-evoked plantar sensation in an ambulatory searching task. 2019 Meeting of Society for Neuroscience (SfN). Chicago, IL, Oct. 2019.
3. B. Christie, **H. Charkhkar**, D. Tyler, R. Triolo. Visual and proprioceptive inputs affect the location of evoked somatosensory percepts in amputees. 2018 Meeting of Society for Neuroscience (SfN). San Diego, CA, Nov. 2018.
4. **H. Charkhkar**, B. Christie, D. Tyler, R. Triolo. The effect of sensory feedback on postural stability in lower-limb amputees. Neural Interface Conference (NIC) 2018, Minneapolis, MN, Jun. 2018.
5. B. Christie, **H. Charkhkar**, D. Tyler, R. Triolo. Somatosensory feedback via peripheral nerve stimulation minimizes postural sway while trans-tibial amputees multi-task. Neural Interface Conference (NIC) 2018, Minneapolis, MN, Jun. 2018.

6. **H. Charkhkar**, B. Christie, D. Tyler, R. Triolo. Elicited sensation in lower-limb amputees could improve their postural stability. Presented at Research ShowCASE, Case Western Reserve University, Cleveland, OH, Apr. 2018 (*Won the First Place award in the postdoctoral research category*).
7. B. Christie, **H. Charkhkar**, E. Graczyk, D. Tyler, R. Triolo. Latency of the perceived sensation evoked by peripheral nerve stimulation in people with lower limb amputations. Biomedical Engineering Society (BMES) Annual Meeting, Phoenix, AZ, Oct. 2017.
8. B. Christie, **H. Charkhkar**, E. Graczyk, D. Tyler, R. Triolo. Timing of restored tactile sensation in people with lower limb amputations. Society for Neuroscience (SfN), Washington D.C., Nov. 2017.
9. **H. Charkhkar**, C. Shell, P. Marasco, D. Tyler, R. Triolo. Sensory restoration in lower-limb amputees using neural interface technology. Presented at Research ShowCASE, Case Western Reserve University, Cleveland, OH, Apr. 2017. (*Won the First Place award in the postdoctoral research category*)
10. S. Gok, **H. Charkhkar**, J. Pancrazio, M. Sahin. *In vivo* impedance characterization of PEDOT:TFB coated and chronically implanted multi electrode arrays. Biomedical Engineering Society (BMES) Annual Meeting, Tampa, Florida, Oct. 2015.
11. D. McHail, **H. Charkhkar**, G. Knaack, H. Mandal, J. Kaste, J. Robinson, J. Pancrazio, T. Dumas. Assessing novel materials to improve chronic cortical implants. Society for Neuroscience (SfN), Washington D.C., Nov. 2014.
12. **H. Charkhkar**, G. Knaack, H. Mandal, D. McHail, J. Kaste, J. Robinson, T. Dumas, J. Pancrazio. Assessing the stability of PEDOT-coated electrodes for chronic cortical implants. Neural Interfaces Conference 2014 (NIC'14), Dallas, Texas, Jun. 2014.
13. **H. Charkhkar**, G. Knaack, M. Wechsler, E. Keefer, J. Pancrazio. CNT/PEDOT coatings improve neural recordings and affect network structure. Neural Interfaces Conference 2012, Salt Lake City, Utah, Jun. 2012.
14. G. Knaack, F. Hamilton, **H. Charkhkar**, N. Peixoto, J. Pancrazio. Unit specific responses to  $\omega$ -agatoxin in a cultured neuronal network. 8th International Meeting on Substrate-Integrated Microelectrode Arrays. Reutlingen, Germany, July 2012.
15. **H. Charkhkar**, G. Knaack, G. Pollack, R. Robbins, B. Gnade, J. Pancrazio, E. Keefer. Design of a novel low-cost MEA for high-content/high-throughput experiments with excitable cells. Biomedical Engineering Society Annual Meeting, Hartford, Connecticut, Oct. 2011.
16. **H. Charkhkar**, E. Cohen. Semi-automatic measurement of damage in stimulated H&E sections of retinal regions. OSEL/FDA Student Science Poster Exhibit, White Oak, Maryland, Aug. 2010.

#### Invited Talks & Seminars

1. Restoring sensation in lower-limb amputees using neural interface technology, 2019 American Orthotic Prosthetic Association (AOPA) National Assembly, San Diego, CA, September 28, 2019.
2. Sensory restoration in people with lower-limb amputation: the first step toward a sensory-enabled prosthesis, State of Science Symposium in Henry M. Jackson Foundation for the Advancement of Military Medicine, Bethesda, MD, May 17, 2019.

3. Restoring natural sensation to lower limb amputees, DARPA HAPTIX program meeting, Charleston, SC, February 21, 2018.
4. Peripheral neural interface technology to restore sensation in lower limb amputees, University of Texas Dallas, Richardson, TX, December 1, 2016.
5. Restoring natural sensation in lower limb amputees, Neural Engineering Center at CWRU, Cleveland, OH, October 28, 2016.
6. Microelectrode arrays for neuronal recordings. Electrical Engineering Department, George Mason University, Fairfax, VA, May 27, 2015.
7. Amyloid beta modulation of neuronal network activity *in vitro*. Unit of Clinical and Transnational Neuroscience, National Institute of Aging (NIA), Baltimore, MD, March 26, 2015.
8. Assessing the biocompatibility and stability of novel materials for chronic cortical implants. Louis Stokes Cleveland Veterans Affairs Medical Center, Cleveland, OH, March 3, 2015.

## Awards

- 1<sup>st</sup> Place award among postdoctoral research presentations at Research ShowCASE, CWRU S'17 & S'18
- Provost Dissertation Fellowship, GMU SU'15
- Graduate Research Fellowship, Dept. Bioengineering, GMU F'10 - S'15
- Graduate Students Travel Award, GMU SU'14
- Volgenau School of Engineering Academic Fellowship, GMU F'11 - S'12
- Oak Ridge Institute for Science and Education (ORISE) Fellowship SU'10

## Teaching, Lectures, & Mentorship

### Teaching & Lectures:

- ECE 334: Linear Electronics Lab, Dept. Electrical Eng., GMU F'09 & S'10
- "Materials for neuronal interfaces *in vitro*," BENG 341: Introduction to Biomaterials, Bioengineering Dept., GMU (Guest lecture). Jul. '13
- "Microelectrode arrays and their applications in neuroscience," NEUR 410: Current Topics in Neuroscience, Dept. of Psychology, GMU (Guest lecture) Nov. '11
- Analytic Geometry and Calculus II, Dept. Civil Engineering, FUM F'03 - F'04

### Mentorship:

APT Center, Louis Stokes Cleveland VA Medical Center

- Breanne Christie, graduate student (PhD) '17-'19
  - Developed series of psychophysical experiments to determine the latency of perceived sensation in response to electrical stimulation
  - Quantifying the impact of sensory feedback during static stance and walking in lower limb amputees.
- Evan Vesper, undergraduate student (Junior in BME) '19
  - Activating reflex pathways via sensory stimulation in lower limb amputees.
- Kevin Cheng, graduate student (MS) '18
  - Investigating neural mechanism of stimulation-induced proprioception in lower limb amputees.
- Natalie Bick, undergraduate student (Senior in BME) SU' 18
  - Analyzing changes in Center of Pressure due to sensory feedback in lower-limb amputees during standing or walking tasks.
- Nathan Bolt, undergraduate student F' 17 - S'18

- Developed MATLAB codes to analyze the effect of adaptation during prolonged stimulation.
- Neha Anilkumar, graduate student (MS) S'17
  - Integrated insole sensors to a prosthetic foot and interfaced the sensor data to external stimulator.
- Alexandra Wolkoff, undergraduate student (Junior in BME) SU'17
  - Analysis of motion capture data from overground walking in lower-limb amputees.

#### Neural Engineering Lab., GMU

- Thao Tran, undergraduate research assistant
  - Received Undergraduate Research Scholars Program (URSP) award S'15
  - Co-author on the article published in *Sensors and Actuators B: Chemical* - 2016
- Susheela Meyyappan, undergraduate research assistant
  - Received URSP award S'13
  - Co-author on the article published in *Brain Research* - 2015
- Jemika Kaste, lab technician S'12-S'14
- Beom Seo Koo, undergraduate research assistant F'13 - S'15
- Lydia Andrawis, undergraduate research assistant F'13 - S'14
- Parham Ghasemi, undergraduate research assistant F'13
- Meena Rezazad, high school student SU'13

#### Professional Service

##### STEM outreach activities:

- Interactive STEM workshop for 10th and 11th graders, Accelerated Learning Program under W.E.B. DuBois Scholars Institute, held at Princeton University, NJ
  - Taught how electrical circuits play a role in our world by teaching students to build a flashlight and a wind turbine Mar. 2, '19
  - Taught engineering design process by teaching students how to design an electric car Mar. 3, '18
  - Taught basic electrical circuits concepts through repairing and adapting toys for children with disabilities Mar. 4, '17
- Co-hosted (with Dr. Nathalia Peixoto) lab visits and provided hands-on experience to promote STEM education:
  - Centerville High School Math Club (24 students) Apr. 9, '15
  - MasonU: underrepresented student populations in K-8 schools (35 students) Mar. 7, '14
  - Bioengineering and Robotics for 8th graders (43 students) Oct. 18, '13
  - Girl Scouts (4th and 5th grade) (15 students) Nov. 5, '13

##### Served as a judge in the following events:

- Research ShowCASE undergraduate poster presentation, Case Western Reserve University Apr. 15, '16 & Apr. 20, '18
- IEEE Region 2 Student Activities Conference, Cleveland State University Apr. 9, '16
- Support of Undergraduate Research & Creative Endeavors (SOURCE) poster session, Case Western Reserve University Dec. 4, '15
- Northern Virginia Regional Science and Engineering Fair - Works of students in Grades 7 through 12 from schools in Alexandria, Arlington, and Falls Church City, VA March 1, '14



Served as reviewer for intramural research grants:

- VA Merit Review Award Program '18, '19
- Rehabilitation Research and Development SPiRE Program, Louis Stokes Cleveland VA Medical Center '17, '18

Invited manuscript reviewer:

- Journal of Neural Engineering '19
- Journal of Neuroscience Methods '19
- Neuromodulation '19
- Molecules '19
- Electronics '19
- Journal of Rehabilitation and Assistive Technologies Engineering '17, '18
- Scientific Reports '17
- IEEE Transactions on Biomedical Engineering '17, '18
- Acta Biomaterialia '16 - '18
- ACS Applied Materials & Interfaces '18
- Neurocomputing '18
- Neuropsychiatric Disease and Treatment '17
- 2D Materials '16
- Journal of Rehabilitation Research and Development '15
- Biotechnology Letters '14
- IEEE Engineering in Medicine and Biology Conference (EMBC) '12, '16, '17, '18
- International Conference on Biomedical Electronics and Devices '16 - '18

- Media Coverage**
- Sensory prosthetic projects presented at the 2nd annual VA Research Day on the Hill Jun. 20, '19
  - On small business: story on international students in the STEM field. Washington Post (J.D. Harrison) Apr. 21, '13
  - Mason Professors Win Virginia Center of Aging Grant. Connection Newspapers (M. Campbell) Oct. 5, '14
  - Cultured neuronal networks on microelectrode arrays as a platform for screening potential Alzheimers drugs. ALTTOX: methods for non-animal testing (Sherry Ward) Aug. 5, '16

- Affiliations with Journals & Conferences**
- Associate editor for *International Journal of Biosensors and Bioelectronics*
  - Editorial Board member for *Insights in Biomedical Engineering*
  - Reviewer Board member for *The Scientific Pages of Biomedical Research*
  - Program Committee Member for *International Conference on Biomedical Electronics and Devices (BIODEVICES'17)*

- Memberships**
- Institute of Electrical and Electronics Engineers (IEEE)
  - Engineering in Medicine and Biology Society (EMBC)
  - Society for Neuroscience (SfN)
  - Biomedical Engineering Society (BMES)
  - National Postdoc Association (NPA)

- Technical Skills**
- **Clinical Research:** Experience in design and characterization of nerve cuff electrodes; Delivering safe electrical stimulation to peripheral nerves; Experience in acquiring regulatory approvals including requirements for IRB and FDA IDE submission and review process; Surgical planning for implant surgery; Effective communication skills to obtain informed consent
  - **Electrophysiology:** Extracellular recordings *in vitro* & *in vivo* and analysis, Stimulating neuronal networks with electrical or chemical stimuli, Experience in

stereotactic surgery on rodents, Whole-cell patch clamp (neurons & PC12 cells)

- **Cellular & Molecular Biology:** Primary neuronal cell culture, Cell and tissue fixation, Immunohistochemistry (IHC), handling rodents (rat & mouse)
- **Electrochemical Characterization:** Electrochemical impedance spectroscopy (EIS), Cyclic voltammetry (CV), Electrochemical deposition of conductive polymers and metals, Accelerated aging, Bio-impedance modeling
- **Microscopy:** Fluorescence microscopy, Scanning electron microscopy (SEM)
- **Software:** MATLAB and Simulink, xPC target, COMSOL, OrCAD, AutoCad, C++, R, SPSS, Vicon Motion Capture, L<sup>A</sup>T<sub>E</sub>X